



UTAH DEPARTMENT *of*
ENVIRONMENTAL QUALITY
**DRINKING
WATER**

2021 Spring Update Highland Subdivision

Introduction/Purpose

- Provide update on data and conclusions
- Spring Boxes (SB) 3 through 7 are permitted as a combined, singular source. Water quality data show they are very different from each other. It would be beneficial to both HWC and DDW if each spring box were treated as a singular source.
- Goal: Provide greater public protection by identifying a path forward to separate and manage the spring boxes as separate sources.

Outline

- Goals of Water Quality and Conclusions from Data
 - pH
 - Alkalinity
 - Iron
 - Flow
 - Bacteriological
- Paths Forward
 - Springs
 - Corrosion Control Study



Gordon Creek Storage Tank

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Gordon Creek Storage Tank

pH Sampling - Purpose

pH

- pH is the concentration of Hydrogen ions
- Ranges from 0-14, 7 is neutral (maximum contaminant level is 6.5 to 8.5) Target range of **7.2 -7.8**
- Log scale: Each unit change means a 10x factor difference
 - pH of 6 is 10x more acidic than pH of 7
- Lower pH= more acidic = tendency to dissolve scale/leach pipe materials
- R309-210-6(4) states that DDW may set a pH range or a minimum pH value that a system needs to meet to control corrosion

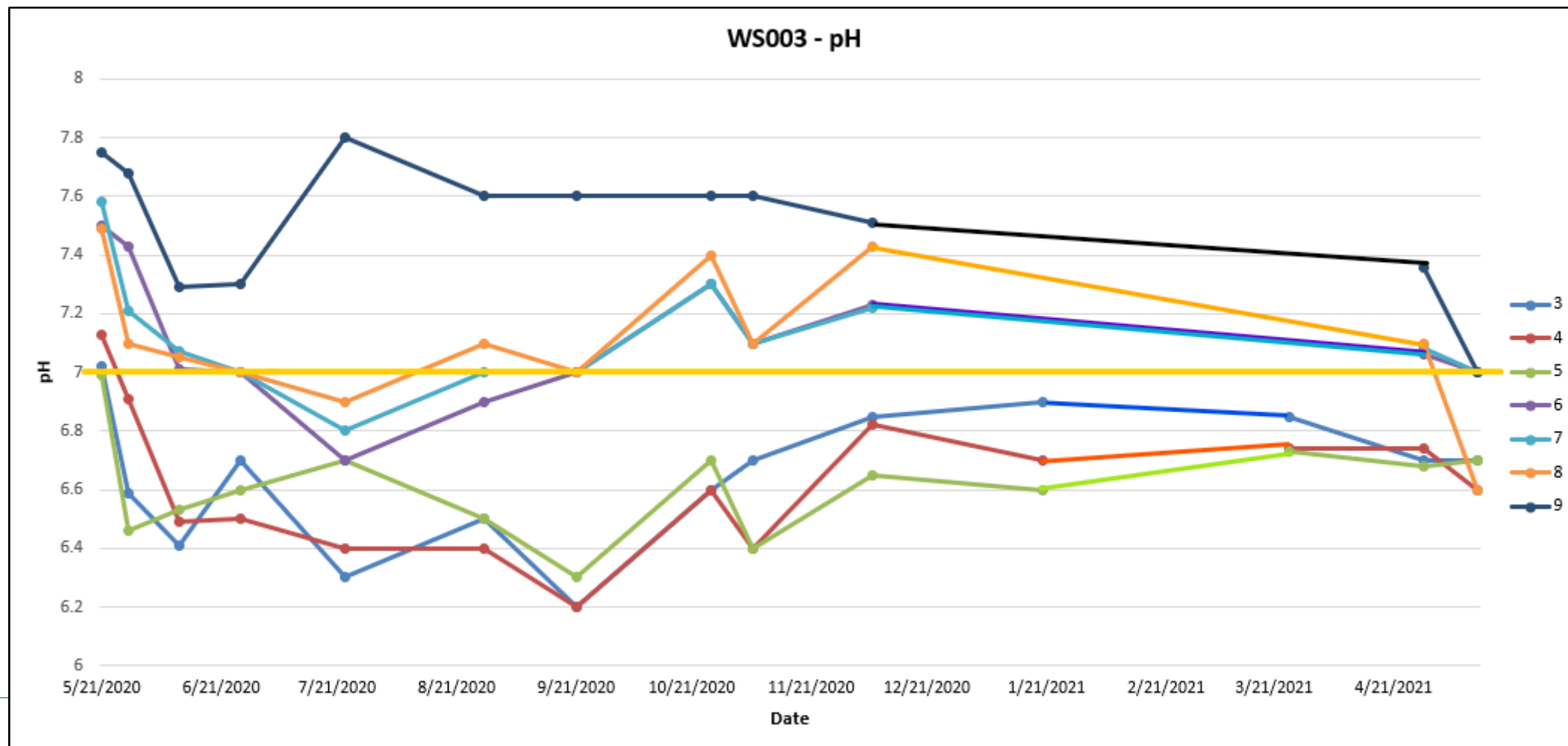
Sampling Requirement

- Monitor monthly at each spring box (2x/month during runoff season)
- Monitor monthly at 3 points in distribution system (Can use routine bacteriological sites)
- Check in response to customer complaint

pH Sampling - Results

Interpretation:

- pH values vary greatly across each spring box:
 - Lowest pH spring boxes (3, 4, 5) are ~30x more acidic than highest pH Spring Box 9
 - Remember pH is log scale
- All spring boxes experience seasonal variability (Less so for Spring Box 9)
- Spring Boxes 3, 4, 5: Lower pH, usually <7
- Spring Boxes 6, 7, 8: Sometimes <7, but usually ~7
- Spring Boxes 9: Consistently >7



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Gordon Creek Storage Tank

Alkalinity Sampling - Purpose

Alkalinity

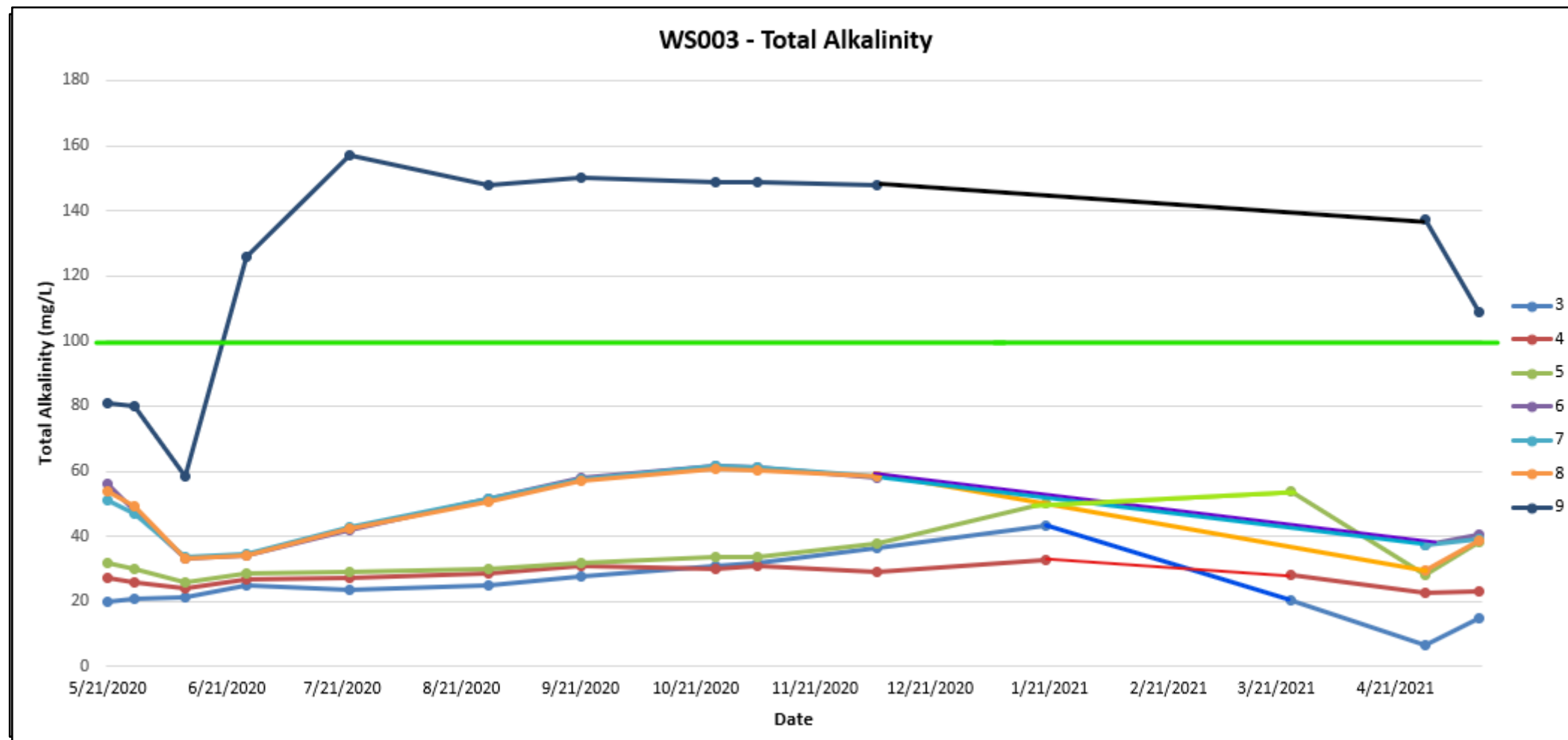
- Alkalinity is a measure of Calcium Carbonate
- Alkalinity affects water's ability to neutralize acid
- High alkalinity (>100 mg/L) = good at resisting changes to pH
- Low alkalinity + variable pH = Swings in water quality = Metals release/colored water issues
- R309-210-6(4) states that DDW may set an alkalinity range that a system needs to meet to control corrosion

Sampling Requirement

- Monitor at each spring box (2x/month during runoff season)
- Monitor at 3 points in distribution system (Can use routine bacteriological sites)
- Check in response to customer complaint

Alkalinity Sampling - Results

- Less variable than pH
- Spring Boxes 3 through 8 have relatively low Alkalinity year-round
- Spring Box 9 has higher Alkalinity, but shows variability
- Clear drop in April 2021 (except for Spring Box 9)



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Iron Sampling - Purpose

Iron

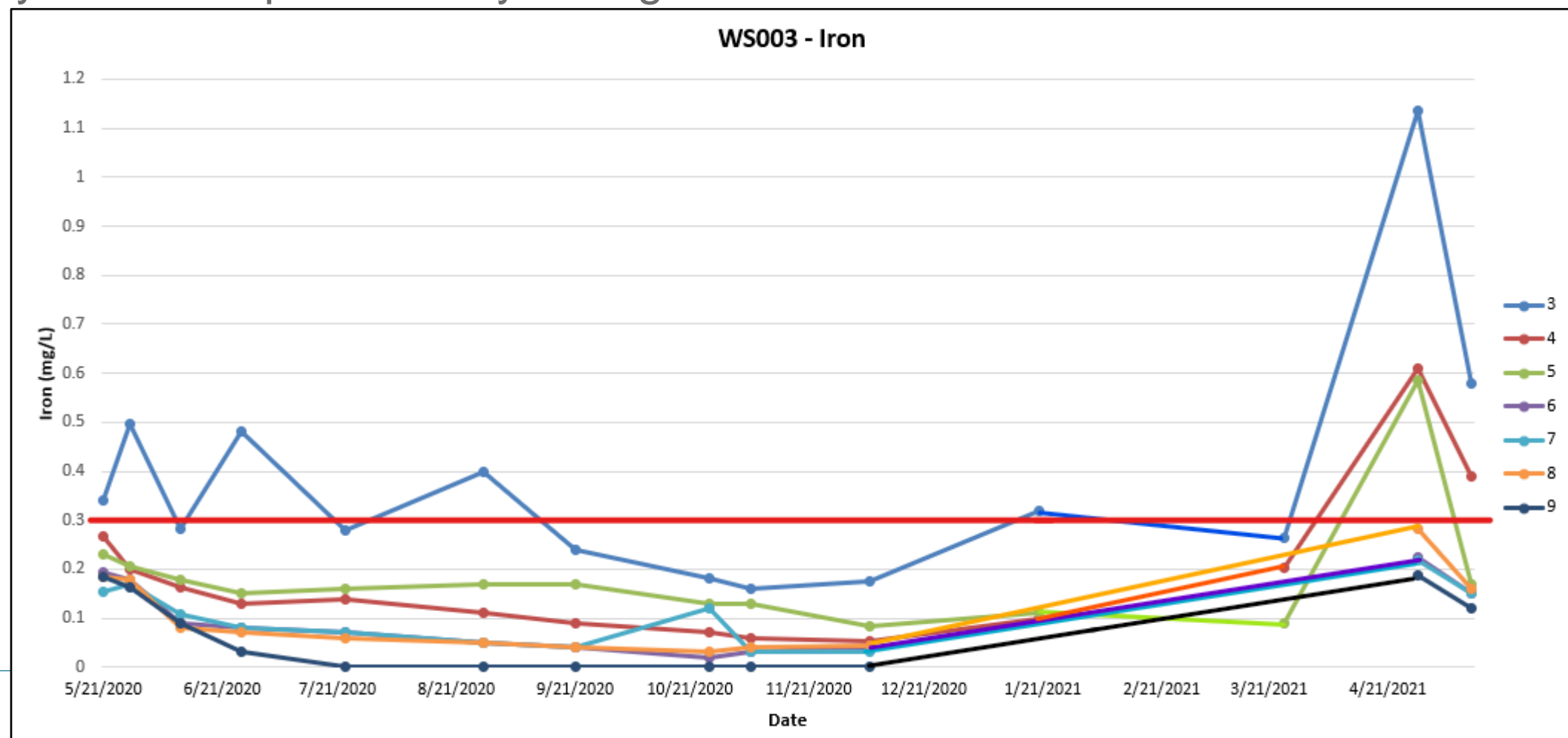
- Iron occurs naturally in environment, also used in piping materials
- EPA has set a secondary maximum contaminant level (SMCL) of 0.3 mg/L
- Can be released from piping materials & premise plumbing due to corrosion
- Common cause of aesthetic issues (brown water, taste/odor complaints)
- Can be an indicator of other metals released due to corrosion (e.g., lead and copper)

Sampling Requirement

- Monitor monthly at each spring box (2x/month during runoff season)
- Monitor monthly at 3 points in distribution system (Can use routine bacteriological sites)
- Check in response to customer complaint

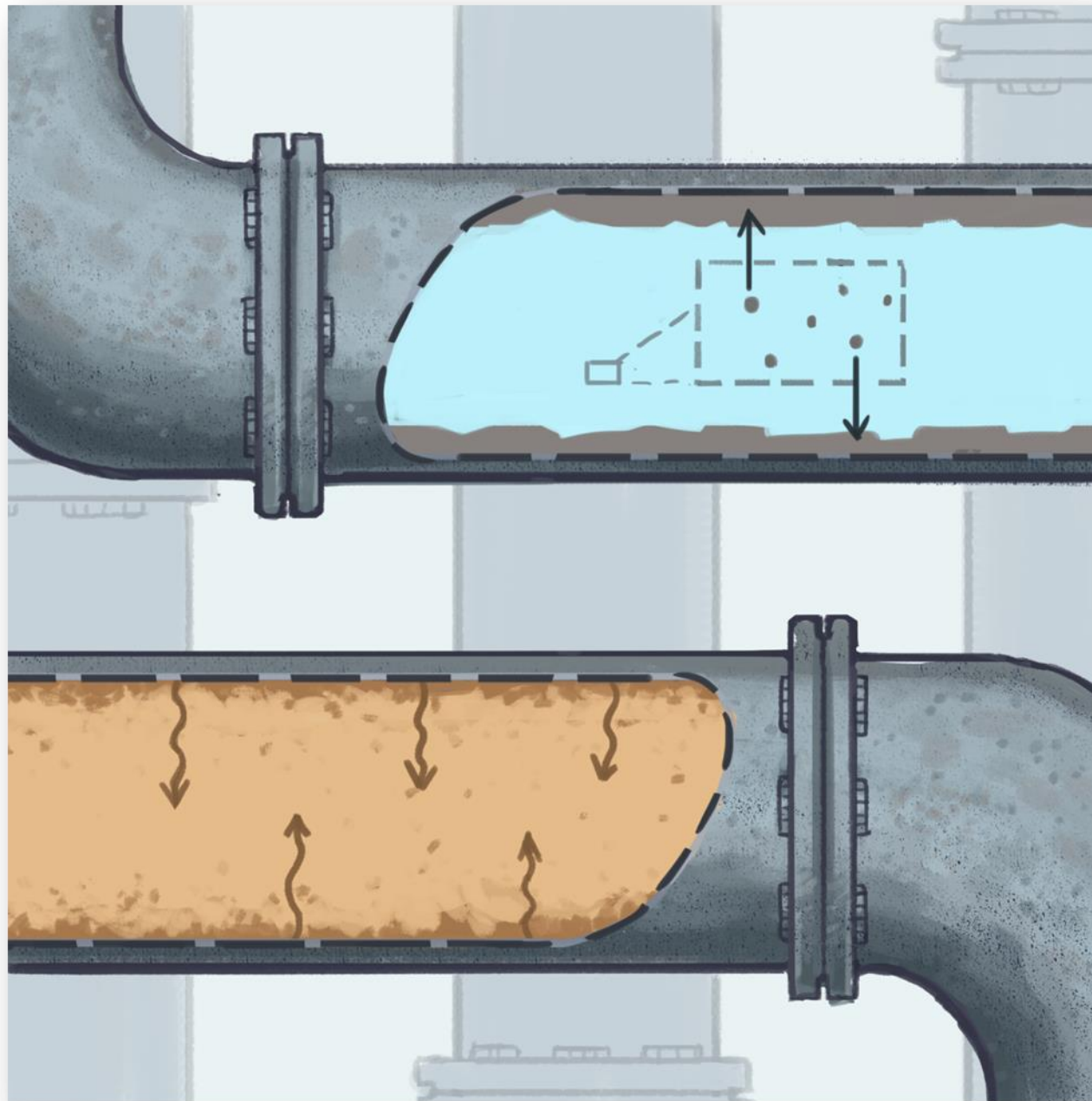
Iron Sampling - Results

- All spring boxes appear to have some seasonality, although some are more variable than others
 - Higher levels seen during runoff period (May 2020, April & May 2021)
- Spring Boxes 3, 4, and 5 above SMCL of 0.3 mg/L
 - Spring Box 8 just below SMCL
- Any Iron components at springs? Iron could be coming from piping materials, ground water, or both
- Likely related to pH/alkalinity changes

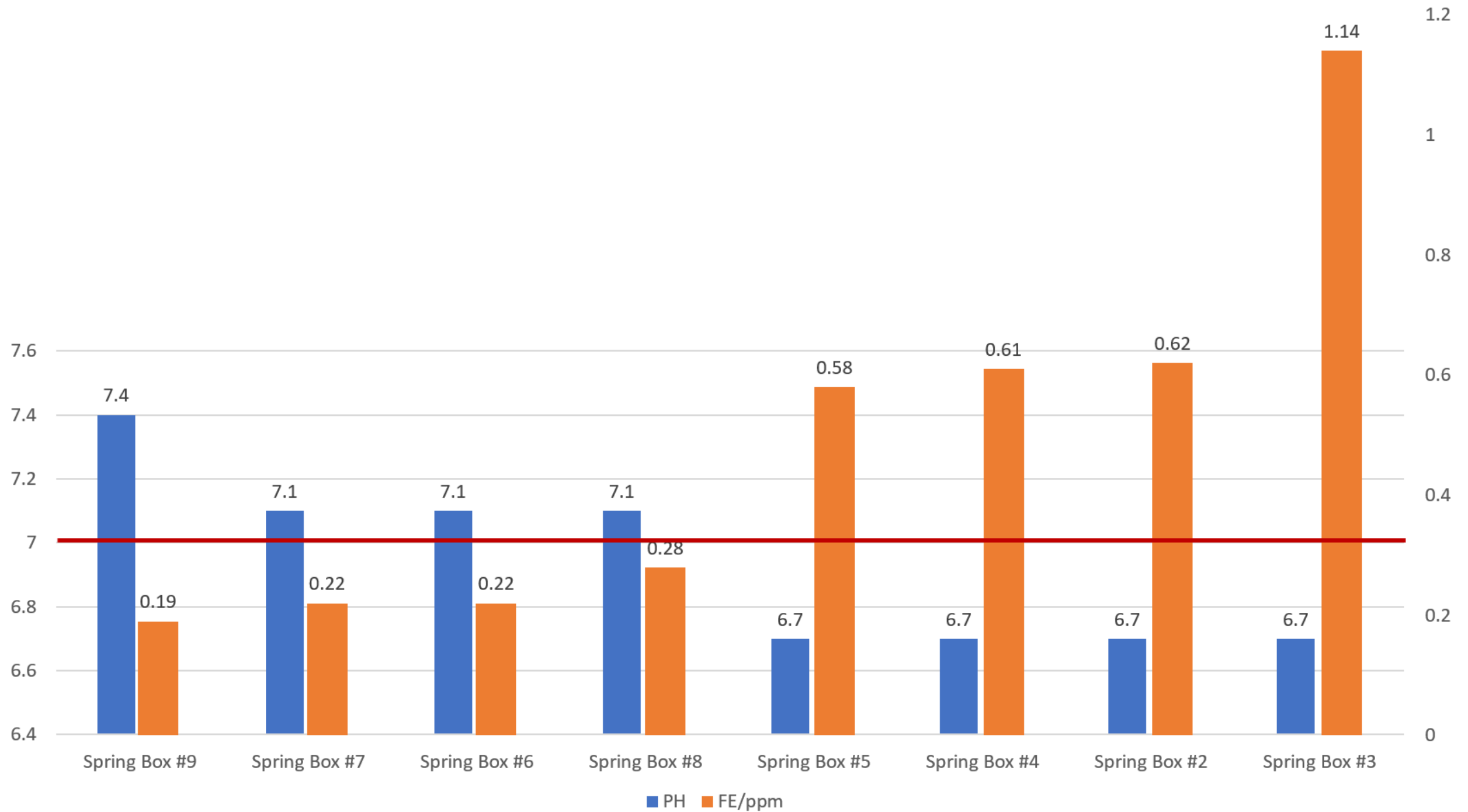


LSI

Langlier Saturation Index (LSI)



Spring Results



Customer Samples

Lab Sample No.: 20F1252-04

Name: Highland Water Company

Sample Site: 5121 Rendezvous

Comments:

Sample Matrix: Drinking Water

PO Number:

Source Code:

Sample Date: 6/19/2020 8:17 AM

Receipt Date: 6/19/2020 9:18 AM

Sampler: Nate Hadley

Project:

System No.: UTAH15005

Report to State: N

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Metals								
Copper, Total	2.00	1.3	0.0010	mg/L	EPA 200.8	06/22/2020	06/22/2020	
Lead, Total	0.0008	0.015	0.0005	mg/L	EPA 200.8	06/22/2020	06/22/2020	

Customer Samples

Name: Highland Water Company	Sample Date: 4/16/2021 1:04 PM
Sample Site: 5121 Rendezvous Rd	Receipt Date: 4/16/2021 2:40 PM
Comments:	Sampler: Nate Hadley
Sample Matrix: Drinking Water	Project:
PO Number:	System No.: UTAH15005
Source Code: DS001	Sample Point: DS001
	Report to State: Y

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Inorganic								
Alkalinity - Bicarbonate (as CaCO3)	112		1.0	mg/L	SM 2320 B	04/16/2021	04/16/2021	
Alkalinity - Carbonate (as CaCO3)	ND		1.0	mg/L	SM 2320 B	04/16/2021	04/16/2021	
Alkalinity - Hydroxide (as CaCO3)	ND		1.0	mg/L	SM 2320 B	04/16/2021	04/16/2021	
Alkalinity - Total (as CaCO3)	112		1.0	mg/L	SM 2320 B	04/16/2021	04/16/2021	
Conductivity	244		1	umho/cm	EPA 120.1	04/21/2021	04/21/2021	
pH	7.7		0.1	pH Units	SM 4500 H-B	04/16/2021 17:06	04/16/2021 17:17	SPH
Metals								
Calcium, Total	43.5		0.2	mg/L	EPA 200.7	04/19/2021	04/20/2021	
Copper, Total	1.00	1.3	0.0010	mg/L	EPA 200.8	04/19/2021	04/20/2021	
Iron, Total	0.27	0.3	0.02	mg/L	EPA 200.7	04/19/2021	04/20/2021	
Lead, Total	0.0015	0.015	0.0005	mg/L	EPA 200.8	04/19/2021	04/20/2021	
Manganese, Total	ND	0.05	0.005	mg/L	EPA 200.7	04/19/2021	04/20/2021	

Customer Samples

Lab Sample No.: 21B0285-01

Name: Highland Water Company	Sample Date: 2/3/2021 8:00 PM
Sample Site: 6762 Weber Dr	Receipt Date: 2/4/2021 10:53 AM
Comments:	Sampler: Nate Hadley
Sample Matrix: Water	Project: CRS. 6762 Weber Dr
PO Number:	System No.: UTAH15005
Source Code:	Sample Point:
	Report to State: N

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Metals								
Copper, Total	62.6	1.3	0.100	mg/L	EPA 200.8	02/04/2021	02/05/2021	
Iron, Total	19.8	0.3	0.10	mg/L	EPA 200.7	02/04/2021	02/05/2021	
Lead, Total	0.253	0.015	0.0005	mg/L	EPA 200.8	02/04/2021	02/05/2021	
Manganese, Total	0.281	0.05	0.025	mg/L	EPA 200.7	02/04/2021	02/05/2021	



Corrosion/Metals Release Issues in Utah

Several other water systems in Utah have experienced similar problems:

Park City:

- Fall 2007 & 2010 customer complaints of discolored brown, coffee-colored water
- Samples exceeded MCLs in distribution system
- Arsenic, thallium, manganese and mercury; Lead in 2007 event
- Conducted public information campaign, provided bottled water, worked w/ DDW to make operational changes

Lehi

- High Thallium levels seen in DS, but levels were low at sources
- Thallium (+ other contaminants) had slowly accumulated in scale on pipes
- Breakdown of scale = release of everything “locked up” in the scale

Richmond City

- High copper levels in homes
- Assessed sources, found springs had low pH & pH dropped during runoff period
- Installing treatment to raise pH

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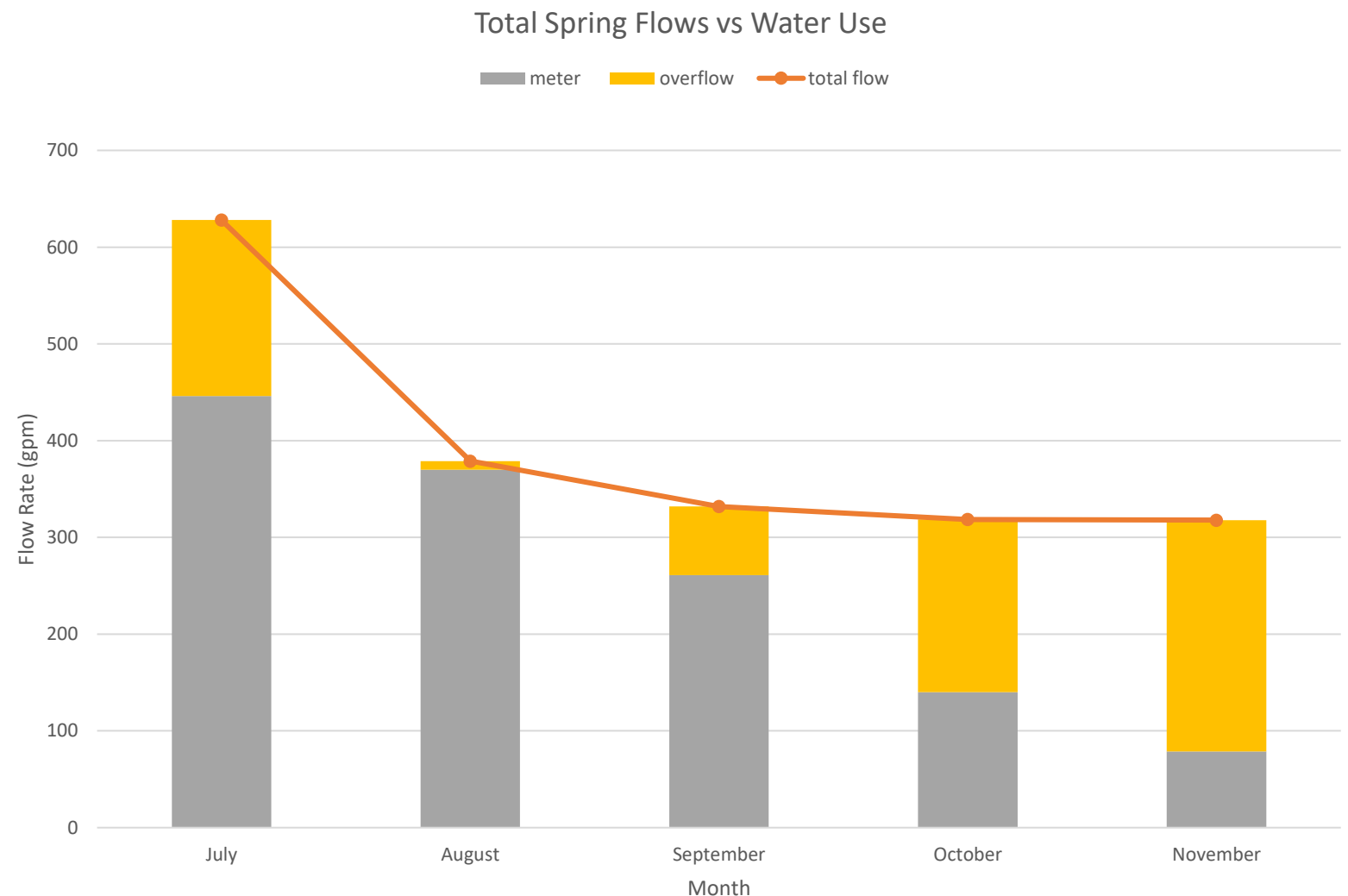
Flow Measurements- Goal

- Goals of Flow Measurements Parameter

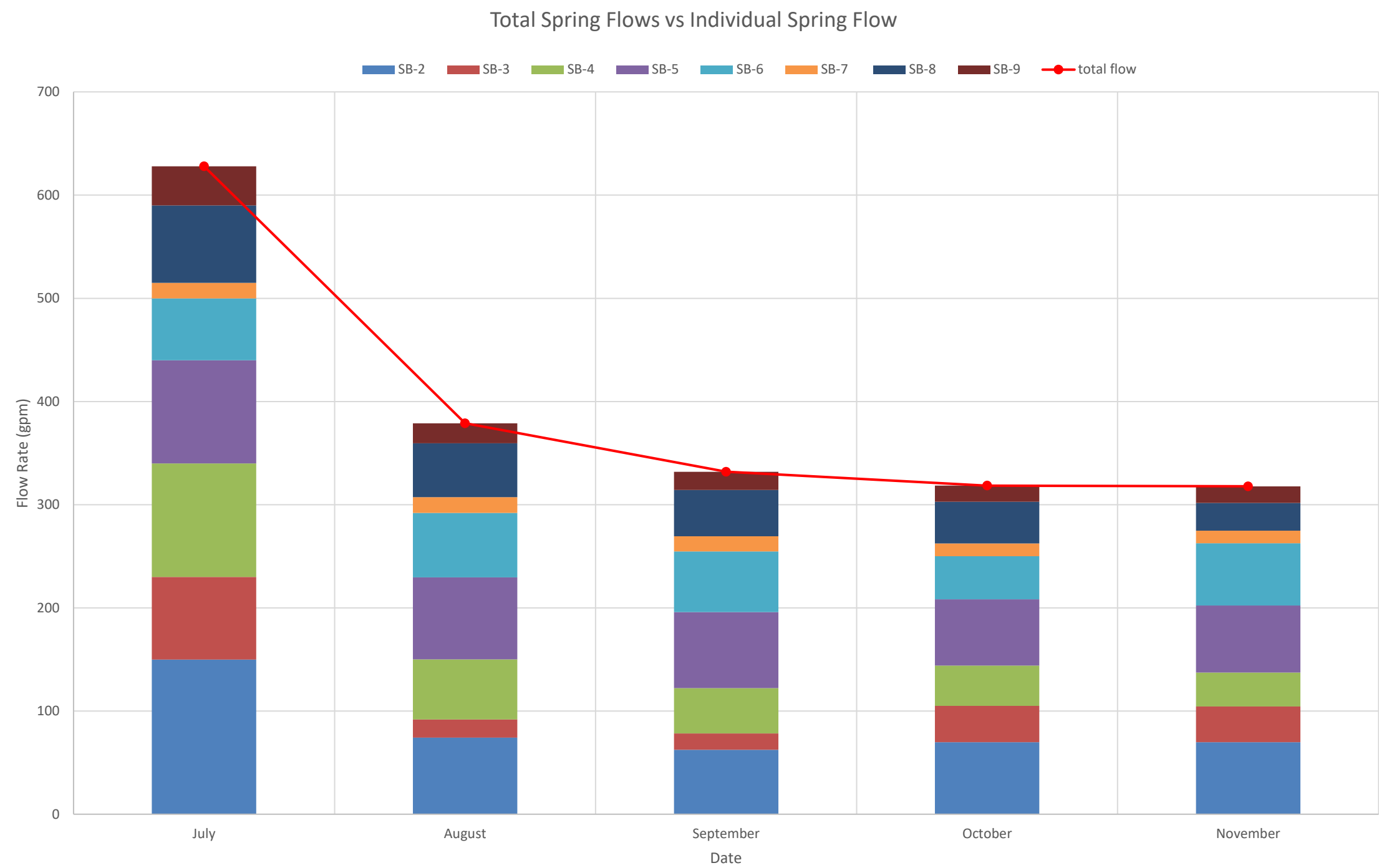
- Requirement of Temporary Spring Determination for Gordon Creek Springs (dated 12/15/2020)
 - Per R309-515-7(5)(b) minimum 3 years of data to establish spring yield
- Water quantity plays an important role with varying water quality from different sources

- Sampling Requirement

- Monthly total flow data
- Submit data annually by 12/31

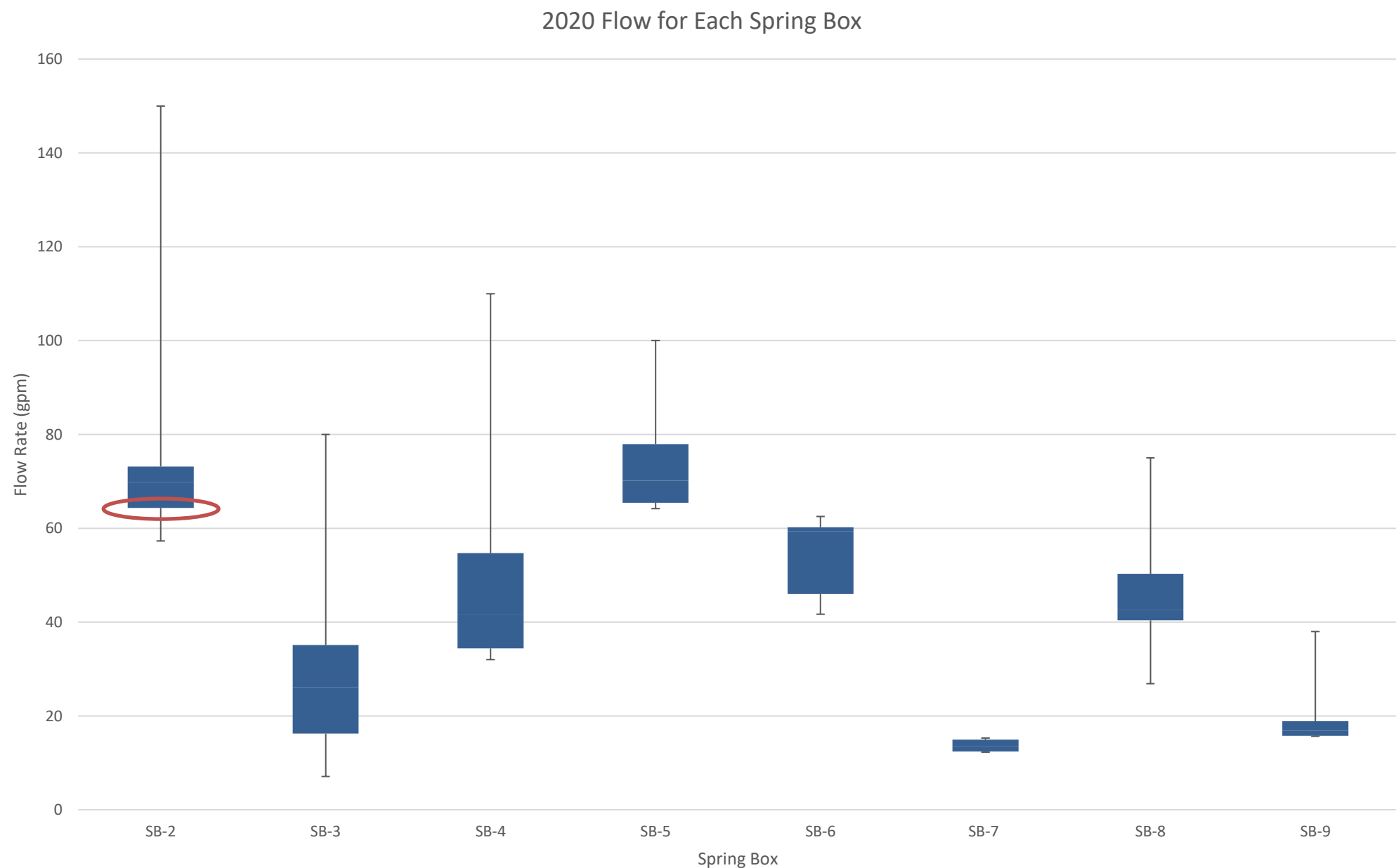


Flow Measurements- Goal



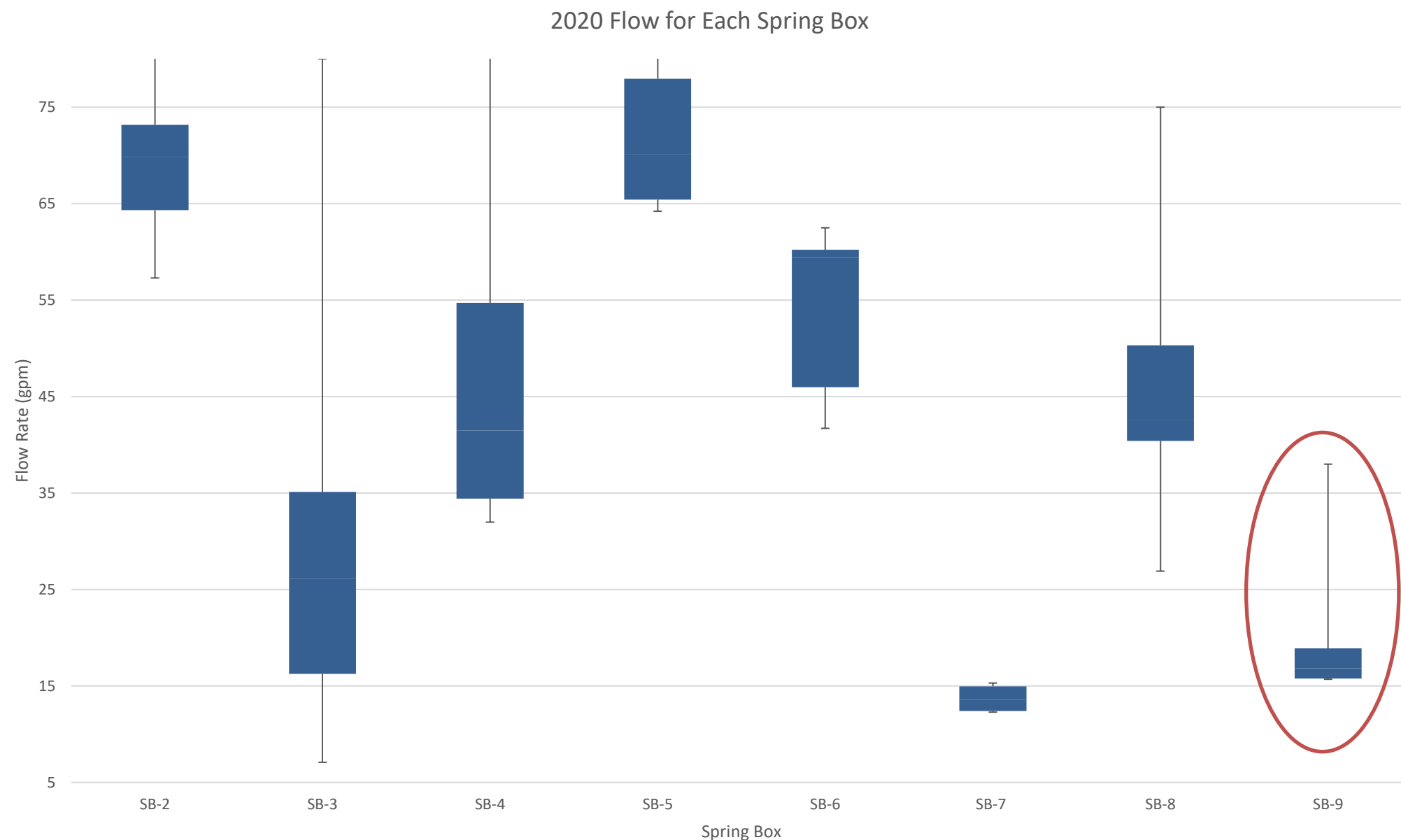
Flow Measurement - Results

- Summary of 2020 data
 - Only have data from August to November of last year



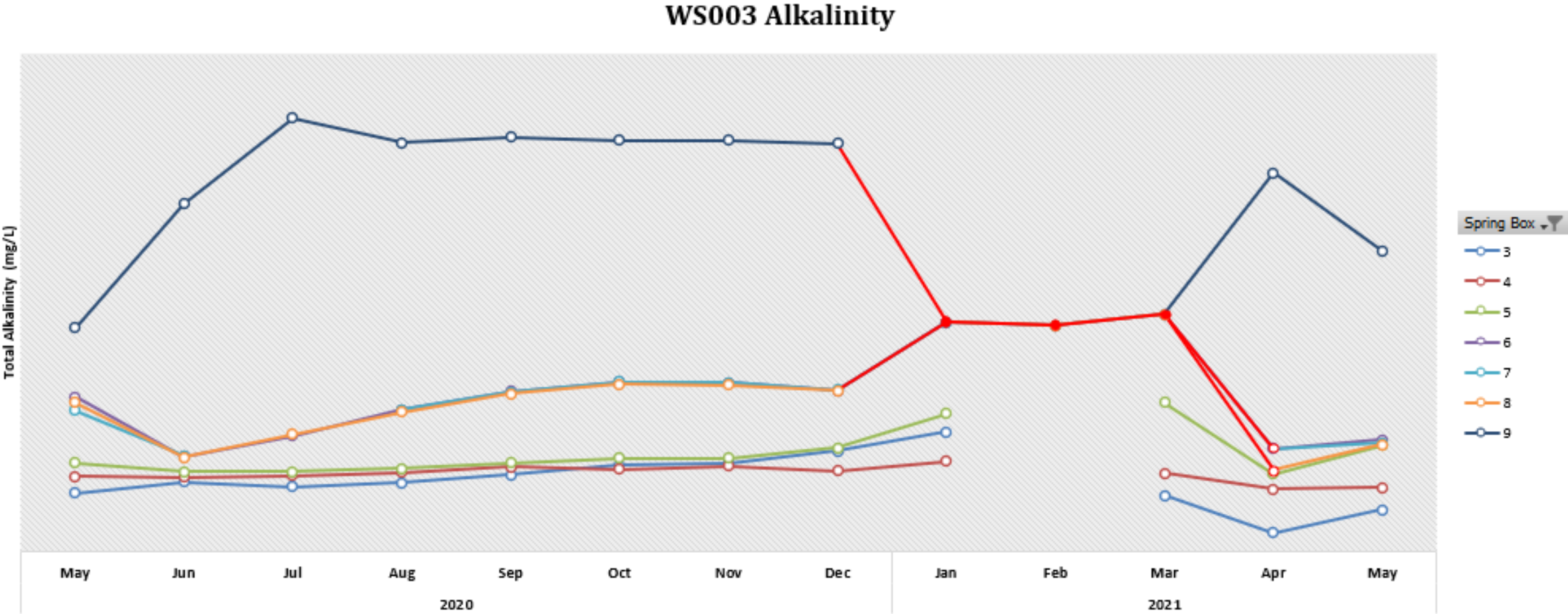
Flow Measurement - Results

- Spring Box 7 and Spring Box 9 make up the least percentage of flow
- Keep collecting low monthly flow data



Flow Affect on Water Quality

Blending as seen in composite sample of Alkalinity



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Bacteriological Sampling- Goal

Goals of Water Quality Sampling Parameter

- Revised Total Coliform Rule (RTCR)/Ground Water Rule (GWR)
 - RTCR is promulgated by the Drinking Water Board as authorized by Title 19, Environmental Quality Code, Chapter 4, Safe Drinking Water Act, Subsection 104 of the Utah Code and in accordance with 63G-3 of the same, known as the Administrative Rulemaking Act
 - RTCR is in place to increase public health protection through the reduction of potential pathways of entry for fecal contamination into distribution systems
 - GWR is promulgated by the Drinking Water Board as authorized by Title 19, Environmental Quality Code, Chapter 4, Safe Drinking Water Act, Subsection 104 of the Utah Code and in accordance with 63G-3 of the same, known as the Administrative Rulemaking Act.
 - The GWR is in place to reduce the risk of illness caused by microbial contamination in public ground water systems.

Sampling Requirement

- Sample at each spring box monthly within Gordon Creek Spring 2 (WS002) and Gordon Creek Spring 7 (WS003) when accessible until July 2021 and October 2021 for Spring Box 4.

Bacteriological Sampling-Result

E. Coli Positive Samples at Individual Spring Boxes (WS003)

- Spring Box 4 had **three positive** samples in August, October, and December 2020
- Spring Box 5 had **one positive** sample in May 2020

Total Coliform Positives Samples from Spring Boxes 4 through 7 (WS003) and Spring Box 2 (WS002)

- WS003 Spring Box 4 – 6 Total Coliform positives in [May](#), [August](#), [October](#), [September](#), [December 2020](#) and [May 2021](#)
- WS002 Spring Box 2 – 4 Total Coliform positives in [July](#), [August](#), [September 2020](#) and [May 2021](#)
- WS003 Spring Box 5 – 1 Total Coliform positive in [May 2020](#)
- WS003 Spring Box 7 – 1 Total Coliform positive in [May 2020](#)
- Master Meter Bldg (WS002 & WS003) - Total Coliform positives in [August 2020](#)

Bacteriological Sampling-Result

Summary results and timelines

- Spring Box 4 due for review in October 2021
 - Depending on sample results/evaluation of data
 - We will evaluate the data throughout the next five months. We want to wait for more data before making any decisions regarding this source.
- Spring Box 5 due for review in July 2021
 - Depending on sample results/evaluation of data

Capital Improvements

Planning for

**CAPITAL
PROJECTS**



Results

Variable water quality

- pH shows large degree of variability between spring boxes, but generally below 7.0
- All spring boxes except Spring Box 9 have relatively low alkalinity
- Seasonality observed for pH and Iron
- Low pH & Alkalinity associated with higher Iron levels, lead and copper, customer complaints

Possible treatment requirements

- Corrosion Study to evaluate turning out specific spring boxes or blending to reduce impact of lower quality springs
- Spring Box 4 and spring box 5 might need full SWTP
- Spring Box 2 and Spring Boxes 4 through 7 could need disinfection, corrosion control, and possible inorganic treatment

Challenge: Combining these springs as a single source makes management difficult. Therefore, the Division is recommending to classify the springs as individual sources.

Proposed Options

1. Make each spring box its own unique source in DDW database

- One operating permit for each of the seven spring boxes
 - Maximize usage and minimizes sampling
 - Utilize the springs with good water quality without restriction
 - Sets up parameters for usage for the low water quality springs boxes
 - Individual samples are only collected when needed from specific spring boxes and group general parameters at group sample station
 - Avoids the UDI/low quality ground water classification for all spring boxes
- Example:
 - *SB-9 can be used without restriction, SB-3 can only be used in July-Feb, and monthly iron, pH, and alkalinity samples should be collected.*

2. Install a Treatment Plant at the combined source location to meet certain pH/Alkalinity ranges & keep all spring boxes running year-round

- Increased operational requirements & more complicated to operate

Any questions?



Next Steps

1. Start modifications to operation permit process

- Submit a written request to the Division
 - Include request for proposed individual spring box operations
 - Include all data that hasn't already been submitted, e.g., individual spring box flows
- Division will take all provided data into account to maximize operations and minimize/streamline sampling
 - Delays may result in Division's classification of Spring Box 4 affecting all WS003 spring boxes